

## Process could revolutionize parts casting

*by Sue Baker, Aeronautical Systems Center*

WRIGHT-PATTERSON AFB, OHIO — A manufacturing technology effort supported by the Air Force Research Laboratory's Materials and Manufacturing Directorate has resulted in a process that could revolutionize and mature the fabrication of metal-composite parts.

The directorate funded extended work on the Advanced Pressure Infiltration Casting Process developed by Metal Matrix Cast Composites Inc., of Wallham, Mass., which allows computer-aided designs to be turned into high-quality, net-shaped finished products in a matter of days.

The new process expands on a technique called rapid prototyping, in which new design concepts demanding lightweight, low-profile, stiffer materials can be manufactured and evaluated quickly. Durable parts for engines and brakes, for example, can be manufactured with a longer life, at nearly half the weight and at much lower cost.

The current market demand for developing complex vehicles and component parts in less time at reduced costs — while emphasizing increased performance, high quality and safety — has created major challenges for designers, engineers and manufacturers, said Dave L. Judson, Air Force program manager.

This process is being used to create connecting rods for two-stroke outboard marine engines, brake calipers, water-cooled brake discs for heavy trucks and aircraft tow vehicles, brake caliper pistons, brake rotors, push rods, racing-bicycle pedal cranks and circuit-board heat sinks.

The APICTM process offers an effective means for developing cost-competitive, metal-matrix-composite products that replace steel and other high-density materials. Compared to parts manufactured in traditional processes, APICTM products weigh only about half as much, are quickly manufactured and are cost-competitive because of accelerated design and engineering time.

The capabilities of this process have been extended to serve the national defense, space and supporting industries, such as telecommunication space satellites, aerospace electronic devices and military armor.

Related research and development now is also being supported by the Navy, the Defense Advanced Research Projects Agency and the National Aeronautics and Space Administration. @